COVID-19 pandemic and rabies: a case report study

Shiva Shadani[1], Hosseinali Soltani [1], and Shima Shekari[1]

[1]North Khorasan University of Medical Sciences

August 29, 2022

Abstract

Rabies is an acute, progressive, and incurable viral encephalitis. The patient was a 13-year-old boy that the Cerebrospinal fluid PCR for rabies and covid-19 test was positive. In emergencies such as the Covid-19 epidemic, an animal disease monitoring strategy should be considered in infectious disease control programs.

COVID-19 pandemic and rabies: a case report study

Introduction

Rabies is a contagious, dangerous, highly deadly disease common to humans and animals. The disease exists in many countries around the world, including Iran (1). The neurotropic virus is a member of the genus Lesaviruses and belongs to the Rhabdoviridae family. Most warm-blooded animals are susceptible to this disease. The virus is specifically present in the saliva of infected mammals and is transmitted by its bite. Once the virus enters the host central nervous system, progressive encephalomyelitis develops (2).

According to World Health Organization, more than 2.5 billion people live in areas at risk of rabies. The death toll from rabies is estimated at 59,000, and the number of people vaccinated against the disease is more than 15 million. Children aged 5-15 are at higher risk (3). Despite the efforts made to strengthen the rabies care and control system in the country, managing this disease is challenging. it is endemic and still highly prevalent in the country, and is still one of the important health challenges. All provinces are under infected with this disease, according to the Pasteur Institute of Iran has been increasing (4).

Coronavirus infected millions, and the WHO declared it a pandemic on March 11, 2020. SARS-CoV-2 entered Iran in February 2017. The rapid spread of Covid-19 disease in all countries has caused countless human and financial losses. Governments have been forced to implement policies such as quarantine and social distancing, and efforts to monitor and control other areas of public health, including rabies, have diminished (5). A study in Peru has shown that the Covid-19 disease has been linked to the spread of rabies and failure to take care of rabies prevention activities has serious effects on rabies and, consequently, on the risk of rabies in humans (6).

Here is a case study of a 13-year-old boy with a history of being bitten by a rabid fox. After his death, Covid-19 test was reported positive, thus emphasizing the importance of the care system in a pandemic situation.

Case presentation

The patient was a 13-year-old boy from Ali Ala village of Esfarayen city in North Khorasan province, with headache and akathisia. The patient had complained of a headache to the family physician and received symptomatic treatment and was referred to the hospital due to the aggravation of the headache and changes in morals. In reported history, it was found that about 2 months ago, the child suddenly had a scratch on the head by a fox while sleeping. The scratch was accompanied by bleeding but they did not go to any

of the health centers. In other records, his father was addicted to methamphetamine, but he denied taking the drug. They did not mention the consumption of canned or vegetarian foods and there were no similar symptoms in the family. Other prodromal symptoms such as coryza, fever, and cough were absent.

Upon arrival at the hospital; the child was alert and extremely restless. He answered the questions appropriately but did not cooperate with the check-up doctor. The patient's vital signs including blood pressure (130/100), heart rate (170 per minute), respiratory rate (25 per minute), central temperature (37 ° C) were recorded. His eyes were proptosis and the pupils were mydriatic. the scratch was seen on his scalp but had healed and had no signs of infection. There was a slight runny of his mouth that became more frequent when was talking. He had photophobia and did not enter the check-up room, which was brighter. He also had hydrophobicity, so he became agitated to receive the patient's serum or glass of water. His respiratory sounds were normal, but in his cardiac auscultation systolic murmurs of 3.6 were heard on the left side of the chest. The cranial nerves examination was normal. he had a gag reflex, and the tonicity of his limbs was 5.5 at the time of admission. In the initial tests of him, leukocytosis (WBC = 19700) was evident along with lymphopenia (lymph: 7%). Other blood types were normal. In the blood gas test, PH: 7.45, PCO2: 30, HCO3: 21, and CPK: 77 were reported.

During the hospitalization, sedative treatment was started to control the patient's agitation. Urine toxicology for amphetamines was evaluated for possible substance abuse. On suspicion of rabies, the city health center was informed and vaccine and rabies serum was injected. Ribavirin was also administered to the patient and he was monitored continuously for clinical symptoms and level of consciousness. To investigate other causes of encephalitis, a Lumbar puncture was performed.

About 14 hours after hospitalization, the gag reflex completely disappeared and dysarthria occurred. On other neurological examinations, the patient developed flaccid paralysis with generalized areflexia. His mouth watering had increased dramatically, but the child was still alert according to the clinical condition, he was intubated and connected to a respirator and died about 24 hours after the patient's visit.

Three saliva samples and skin biopsies were prepared from hair follicles in the neck area and brain tissue biopsies were performed after the patient's death to evaluate rabies, which was sent to the Pasteur Institute of Iran.

The submitted tests were negative for amphetamines. Polymerase chain reaction (PCR) testing of cerebrospinal fluid (CSF) was reported to be positive for rabies as well as COVID-19. In the samples sent to the Pasteur Institute of Iran, the diagnosis of rabies was confirmed by Negri bodies.

Discussion

We presented a case of a 13-year-old boy diagnosed with rabies and covid-19 infection.

The Covid-19 pandemic has made public health departments necessarily shift their focus and resources to enforcing stay-at-home orders and stepping up emergency preparedness efforts. Reducing the vaccination coverage of dogs as well as reducing monitoring, which leads to an increase in the lifespan of infected dogs, can lead to a sharp increase in rabies in dogs and thus the risk of rabies in humans (6).

The rabies virus belongs to the Rhabdoviridae family and lyssavirus genus. the virus causes acute disease of the central nervous system is specific to domestic and wild carnivores, and humans and other warm-blooded vertebrates are infected accidentally, often through bites. The fatality rate of the disease is so high that after the appearance of clinical symptoms in both humans and animals, treatment is not possible and death will be inevitable (7).

Rabies in humans is divided into four periods. The incubation period usually lasts 15 days to 3 months (average 1-2 months) (8). The present patient was also bitten by a fox on the head about 2 months before the onset of symptoms. The most dangerous areas are the hands, neck, face, and head, which lead to shorter incubations due to the reduction in the length of neurons and the increase in their number. RABV can

generally persist in muscle for a long time, which may increase the chances of post-exposure treatment and clearance of RABV by the host immune system (9).

The second period is the onset of early signs in the patient. The duration is 1-4 days, and at the end of the incubation period, the rabies virus penetrates the junction of nerves and muscles or the ends of superficial motor nerves and spread to the spinal cord of the central nervous system. The virus reaches the spinal cord 2-8 mm per day. Early nonspecific symptoms of rabies include fever and chills, fatigue, headache, muscle weakness, pain, bloating, difficulty swallowing, nausea, and vomiting. In the reported patient, headache and agitation were the primary cause.

The third stage, acute neuropathy, beginning with dysfunction of the central nervous system occurs in two forms: furious and paralytic rabies (2). Furious rabies symptoms include aimless running and paddling, irritability and agitation, hallucinations, anxiety, and excitement, increased salivation, and difficulty swallowing. hydrophobia causes the diaphragm and respiratory muscles to contract. Evidence has shown upper motor nerve palsy weakness, increased tendon response, positive plantar reaction (Babinski reflex), paralysis of Vocal cords. Furthermore, Diplopia, facial muscle paralysis, and optic nerve neuritis occur. while the course of paralytic rabies is usually longer than furious and accounts for about 20% of cases (2, 10).

Eventually, in the fourth stage, the patient sinks into a coma then dies. The onset of clinical symptoms to death takes an average of 4 to 7 days. In rare cases with intensive care patients have a longer life expectancy.

To date, only 29 human rabies survivors have been reported worldwide. Three of them (10.35%) were treated with Milwaukee protocol and others were under intensive care survived. Accordingly, this method should be followed due to the fact that the treatment of rabies is possible (11).

The annual trend of animal bites is increasing in Iran. This rate has increased from 35.1 cases in 1987 to 167 cases in 2012 in 100,000 populations (12). To control animal bites, it is recommended that the veterinary and health networks of the cities take operational measures such as vaccination of endangered people, vaccination of pets, eradication of stray dogs, control of high-risk centers (areas or villages where the prevalence of animal bites is high), Attracting public participation, especially the creation and involvement of administrative officials and political advocacy of cities through raising the issue in the working group of health and food security of the city not only prevented rabies mortality but also reduced animal bites and reduced the economic and financial burden caused by Vaccine and serum were prepared. On the other hand, due to the efforts of public health officials to protect the population around the world from Covid-19 disease, it is essential to develop a strategy to monitor and prevent rabies during the COVID-19 epidemic. Unfortunately, in emergencies such as the Covid-19 pandemic, animal disease monitoring is ignored in infectious disease control programs. The true extent of Covid-19 damage may not be known for years or decades as uncontrolled diseases such as rabies increase during this time.

Funding: None

Acknowledgment We thank our colleagues who provided insight and expertise that greatly assisted the research.

Conflict of interest : Authors state no conflict of interest

Ethics statement:

Our institution does not require ethical approval/statement for reporting individual cases or case serie.

Written Consent from the patient : Written informed consent was obtained from the patient to publish this report in accordance with the journal's patient consent policy

Detailed author's contribution:

Hosseinali Soltani : Final approval of the version to be published

Shiva Shadani: Collected the data and drafting the article

Shima Shekari : Conception

Parya Alidadiani : Wrote the paper

Data availability Statement: The data that support the findings of this study will be available in Imam Ali hospital, Bojnurd, North Khorasan, Iran.

1.Nadalian MG, MR M-DJIJoRHR. Rabies and Its Present Situation in Iran. 2016;1(2):32-4.

2.Rupprecht CEJMm. Rhabdoviruses: rabies virus. 1996;4.

3.Rabies: Human vaccines *hwwirv* , WHO heGWHO, 2014.

4.Mostafavi E, Moradi G, Rahmani K, Jahanbakhsh F, Eybpoosh S, Keypour M, et al. Rabies surveillance system in iran: History, structures, and achievements. 2020;16(1):38-47.

5.Anderson RM, Heesterbeek H, Klinkenberg D, Hollingsworth TDJTl. How will country-based mitigation measures influence the course of the COVID-19 epidemic? 2020;395(10228):931-4.

6.Raynor B, Díaz EW, Shinnick J, Zegarra E, Monroy Y, Mena C, et al. The impact of the COVID-19 pandemic on rabies reemergence in Latin America: The case of Arequipa, Peru. 2021;15(5):e0009414.

7.Buthelezi SG, Dirr HW, Chakauya E, Chikwamba R, Martens L, Tsekoa TL, et al. The Lyssavirus glycoprotein: A key to cross-immunity. 2016;498:250-6.

8.Riabi HRA, Ghorbannia R, Mazlum SB, Atarodi AJJoc, JCDR dr. A Three-year (2011–2013) Surveillance on Animal Bites and Victims Vaccination in the South of Khorasan-e-Razavi Province, Iran. 2015;9(12):LC01.

9.Hemachudha T, Laothamatas J, Rupprecht CEJTLN. Human rabies: a disease of complex neuropathogenetic mechanisms and diagnostic challenges. 2002;1(2):101-9.

10.Yousaf MZ, Qasim M, Zia S, Ashfaq UA, Khan SJVj. Rabies molecular virology, diagnosis, prevention and treatment. 2012;9(1):1-5.

11.Nadeem M, Panda PKJJofm, care p. Survival in human rabies but left against medical advice and death followed–Community education is the need of the hour. 2020;9(3):1736.

12.Gholami A, Fayaz A, Farahtaj FJJomm, diseases i. Rabies in Iran: past, present and future. 2014;2(1):1-10.

Hosted file

`title page.docx` available at https://authorea.com/users/504396/articles/583767-covid-19-pandemic-and-rabies-a-case-report-study